WRC-CANX
CAN Bus Extender, Version 2
User's Manual

Western Reserve Controls, Inc.

Although every effort has been made to insure the accuracy of this document, all information is subject to change without notice. WRC takes no liability for any errors in this document or for direct, indirect, incidental or consequential damage resulting from the use of this manual.

Document PUB 14.0
Rev 2.15
March 2002

Copyright © 1997 – 2002 WRC

Western Reserve Controls, Inc.
1485 Exeter Road
Akron OH 44306
330-733-6662 (Phone)
330-733-6663 (FAX)
sales@wrcakron.com (Email)
http://www.wrcakron.com (Web)

SmartMux-Lite, CAN-Bus Extender and WRC are trademarks of Western Reserve Controls, Inc.
DeviceNet is a trademark of the Open DeviceNet Vendor Association, Inc. ("ODVA").
SDS is a trademark of the Honeywell, Inc.
All other trademarks are property of their respective companies.

TABLE OF CONTENTS

1. OVERVIEW 3

1.1. FEATURES 3
1.2. BASIC OPERATION 4
1.3. ORDERING OPTIONS 4
1.4. REFERENCE DOCUMENTS 5

2. USING THIS MANUAL 6

3. QUICK START 7

4. GENERAL SPECIFICATIONS 8

5. HARDWARE INSTALLATION AND CONFIGURATION 9

5.1. OVERVIEW 9
5.2. DIP SWITCH SETTINGS 11
5.2.1. Slide Switch Version 11
5.2.2. Piano Switch Version 12
5.3. LED OPERATION 12
5.4. POWER REQUIREMENTS 14
5.5. NETWORK CABLING AND CONFIGURATION 14
5.5.1. Cable Lengths 14
5.5.2. Network Termination 15
5.5.3. DeviceNet Connection Wiring 17
5.5.4. SDS Bus Connection Wiring 19

6. OPERATION 20

6.1. APPLICATION NOTES 20
6.1.1. General Installation 21
6.1.2. CANX Theory of Operation 21
6.1.3. Network Throughput Design Considerations 21
6.1.4. Fixed Operation 22
6.1.5. Autobaud Operation 22
6.1.6. Example Configurations 22

7. ACCESSORIES AND OTHER CAN PRODUCTS 24

8. TROUBLESHOOTING 26

LIST OF FIGURES

FIGURE 1-1 TYPICAL CANX NETWORK CONFIGURATION 4
FIGURE 5-1 WRC-CANX-DIN CAN-BUS EXTENDER 9
FIGURE 5-2 WRC-CANX-NEM CAN-BUS EXTENDER 10
FIGURE 5-3 WRC-CANX-NEM-DN 11
FIGURE 5-4 DIP SWITCH SETTING FOR BAUD RATE – SLIDE SWITCH 11
FIGURE 5-5 DIP SWITCH SETTINGS – PIANO SWITCH ONLY 12
FIGURE 5-6 WRC-DANX-DIN-DN DEVICENET CABLE CONNECTOR 17
FIGURE 5-7 DEVICENET CABLE SPECIFICATIONS 17
FIGURE 5-8 WRC-CANX-NEM POWER AND DEVICENET CONNECTORS 18
FIGURE 5-9 SDS MINI CONNECTOR 19
FIGURE 6-1 CANX ON A DROP LINE 23
FIGURE 6-2 CANX ON TRUNK LINE AND DROP 23

LIST OF TABLES

TABLE 1-1 CANX ORDERING OPTIONS 5
TABLE 5-1 BAUD RATE SETTINGS FOR SLIDE SWITCHES 11
TABLE 5-2 BAUD RATE SETTINGS – PIANO SWITCH ONLY 12
TABLE 5-3 MODULE STATUS LED (LABELED MS) 13
TABLE 5-4 NETWORK STATUS LED'S (LABELED NSA AND NSB) 13
TABLE 5-5 DIAGNOSTIC STATUS LED'S (LABELED DGN) 14
TABLE 5-6 NETWORK MAXIMUM LENGTHS - DEVICENET 14
TABLE 5-7 NETWORK MAXIMUM LENGTHS - SDS 15
TABLE 5-8 TERMINATING RESISTORS 15
TABLE 7-1 ADDITIONAL WRC DEVICENET PRODUCTS 25

1. Overview

The WRC-CANX Extenders is a family of products that extend the communications cable lengths for DeviceNet, SDS (Smart Distributed System) and other CAN, V2.0, Part A, serial bus systems. By allowing the user to extend the bus length for any given speed, they assist the user in cost-effectively implementing I/O or other nodes on these buses at remote locations that would be more difficult or more expensive to do otherwise.

A WRC-CANX Extender (the family members collectively referred to here as CANX or Extender) can be connected in a bus trunk line or drop line and is transparent to the other nodes on the bus. It receives and actively re-transmits (store-and-forward) each message from either side of the network without interpreting the message or acting upon it.

Each product has two network interfaces with an electrical isolation path between the two. Power is delivered to the unit through the network connectors. For DeviceNet and SDS systems power is provided through the 5-conductor bus cable.

1.1. Features

The WRC-CANX has the following features:

- Extends CAN-Bus cable lengths - trunk line or drop lines
- Expands the usable applications for CAN-Bus systems
- Operates at 125K, 250K and 500K baud
- Allows operation at higher speeds for specific distances
- No configurable parameters
    - Automatic baud rate selection
    - No address selection required
- Isolates the two sides of the bus - 2500 volts
- Logically transparent to the Master and Slave devices on the bus
- DeviceNet; SDS; CAN, V2.0, Part A compatible
- Powered from the 24Vdc supplied by bus network or the user
- Two mechanical packages:

DIN rail mount:	WRC-CANX-DIN
Sealed NEMA-4X enclosure:	WRC-CANX-NEM

- 5-pin pluggable connection for the DIN mount unit
- 5-pin round mini-style connection for the NEMA mount unit
- Standard CAN chips manage bus error detection
- Standard CAN chips handle message bus contention
- Less than 100 µsec latency
- 3 bi-color (red/green) status LED's
- 1 red diagnostic LED
- CE Compliant for WRC-CANX-NEM-xx versions
    - EN 55011 Class A
    - EN 50082-2: 1994

1.2. Basic Operation

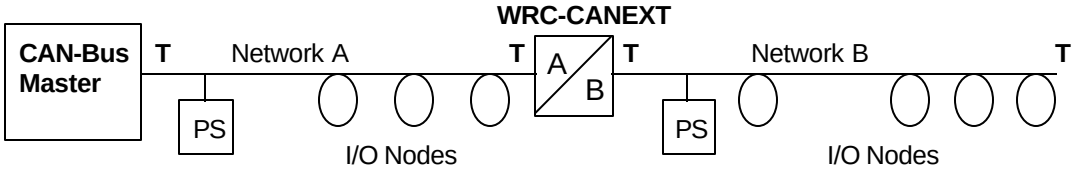
There are two bus connections for each CANX, referred to as Network A and Network B. The CAN Bus is connected to each side of the CANX and each side receives its power and signals from the Bus on its respective side. See

Figure **1-1** for a typical application.

Whenever a message is transmitted on the Bus to which CANX is connected, CANX receives the message on the side where it was initiated and performs a store-and-forward of the message to the other side. It then transmits the message to the bus on the other side, following the defined bus arbitration rules. This action is performed for any valid CAN message independent of who generated it or to whom it is intended.

There is approximately a 75 µsec propagation delay of the message through the CANX.

The CANX is not addressed as a specific device on the Bus and cannot be interrogated by other nodes. It is transparent to all other nodes on the bus.



Terminating resistors indicated by "T"

Figure 1-1 Typical CANX network configuration

1.3. Ordering Options

Several options are available, depending upon which bus network is used and which package choice is desired.

Table 1-1 CANX Ordering Options

Bus Network	DIN Mount	NEMA Enclosure
DeviceNet	WRC-CANX-DIN-DN	WRC-CANX-NEM-DN WRC-CANX-NEM-AU (see Figure 5-8 WRC-CANX-NEM Power and DeviceNet Connectors for differences)
SDS	WRC-CANX-DIN-SD	WRC-CANX-NEM-SD
Other CAN Bus	WRC-CANX-DIN-CU	WRC-CANX-NEM-CU

1.4. Reference Documents

The following documents are referenced in this User's Manual

- ODVA DeviceNet Specification Volume I, Release 2.0
- Honeywell Micro Switch Specification GS 052 104, "SDS Smart Distributed System Physical Layer Specification", release date 12/8/1994

2. Using This Manual

This manual serves to help the user to understand the capabilities of the CAN-Bus Extender product family and how to install and configure an I/O subsystem using these products.

Section 3 describes how to quickly connect your WRC-CANX and get it up and running on the DeviceNet, SDS or other CAN-Bus link.

Section 4 provides the technical specifications for the products.

Section 5 describes the installation of the hardware, including mounting, cabling, connection to other I/O subsystem components, and power requirements.

Section 6 provides some additional operational information.

Section 7 lists common accessories that are used with the WRC-CANX.

Section 8 provides some troubleshooting hints in the event your CAN-Bus Extender is not operating as anticipated.

3. Quick Start

To quickly and easily install your CAN-Bus Extender in your DeviceNet system, follow the instructions below. For more details, see Section 5.

To Install and Establish Communications

1. Remove the CAN-Bus Extender from the box and connect your CAN-Bus cable to the 5-pin plugs (supplied with CANX-DIN) or the mini-style connectors (user-supplied) according to wiring specifications for the CAN Bus you are using and described later in this manual.
2. Set the DIP switch (switches 5-6) to the desired baud rate. (ON-ON = 125k, ON-OFF = 250k, OFF-ON = 500k, OFF-OFF = autobaud.)
3. Identify the two sides of the Bus as Network A and Network B. In a Master/Slave configuration, define Network A as the side toward the Master. Identify Network B as the part of the Bus away from the Master.
4. Terminate each side of the CAN-Bus network, as appropriate. (This is especially critical at the higher baud rates.)
5. Make sure that there is power on the CAN-Bus Network A and plug the Network A cable into the CAN-Bus Extender on the side marked Network A.
6. The CAN-Bus Extender will undergo its initialization sequence, flashing the LED's. After approximately 5 seconds, the Module Status LED (labeled "MS") will go on solid green and network LED's (labeled "NSA" and "NSB") will flash green.

   Note: For Autobaud, Network Side A must be powered up first.
7. Make sure that there is power on the CAN-Bus Network B and plug the Network B cable into the CAN-Bus Extender on the side marked Network B.
8. Both Network A and B Status LED's (NSA and NSB) will go on solid once a valid CAN message is received into either side of the Extender and the baudrate auto-detect has been successfully performed.
9. The CAN-Bus Extender is now operating on the network and is ready to repeat messages from either Network A or Network B.

4. General Specifications

Product: WRC-CANX-DIN and WRC-CANX-NEM CAN-Bus Extender

Description: Electrical extender to extend the permitted cable distances defined for CAN-based network products

Device Type: Communications Extender

Product Revision: 2

DeviceNet Conformance: Designed to conform to the ODVA DeviceNet Specification Version 2.0.

Baud rate: 125K, 250K, 500K, 1M - automatic selection

Address selection: Not applicable

Bus Connection:

WRC-CANX-DIN

Extender:	5-pin pluggable header (male pins) Phoenix Contact MSTBA 2.5/5-G-5.08/AU
CAN-Bus Cable:	5-contact plug (female contacts) Phoenix Contact MSTB 2.5/5-ST-5.08/AU (included)

WRC-CANX-NEM

Extender:	Turck # RKF50, female sockets, female threads Turck # RSF50, male pins, male threads
CAN-Bus Cable:	See accessories list

Status Indicators:

Module Status:	green/red bi-color LED
Network A Status:	green/red bi-color LED
Network B Status:	green/red bi-color LED
Diagnostic Data:	green/red bi-color LED

Voltage Isolation: 2500 V

Maximum power:

Voltage: 11 - 25 Vdc
Current: Network A: 140 mA @ 11 Vdc - 60 mA @ 25 Vdc
Network B: 20 mA @ 11 Vdc - 10 mA @ 25 Vdc
Power: 1.8 W

Mounting:

WRC-CANX-DIN:	DIN rail mount, EN 50022
WRC-CANX-NEM:	Panel-mount, 4 screws

Size:

	WRC-CANX-DIN	WRC-CANX-NEM
Length:	4.32" (110 mm)	5.11" (130 mm)
Depth:	1.79" (45,5 mm)	2.27" (57,7 mm)
Height:	3.44" (87,4 mm)	3.70" (94,0 mm)

Operating Temp: 0-70 ºC

Humidity: 0-95% RH, non-condensing

5. Hardware Installation and Configuration

5.1. Overview

A CAN-Bus Extender is a single device connected to two parts of a single CAN-Bus network. The CANX-DIN is to be mounted on an EN50022 DIN rail (available from WRC and WRC's distributors as part number WRC 50022) in any orientation. The CANX-NEM is a NEMA-4X enclosure and is panel mounted.

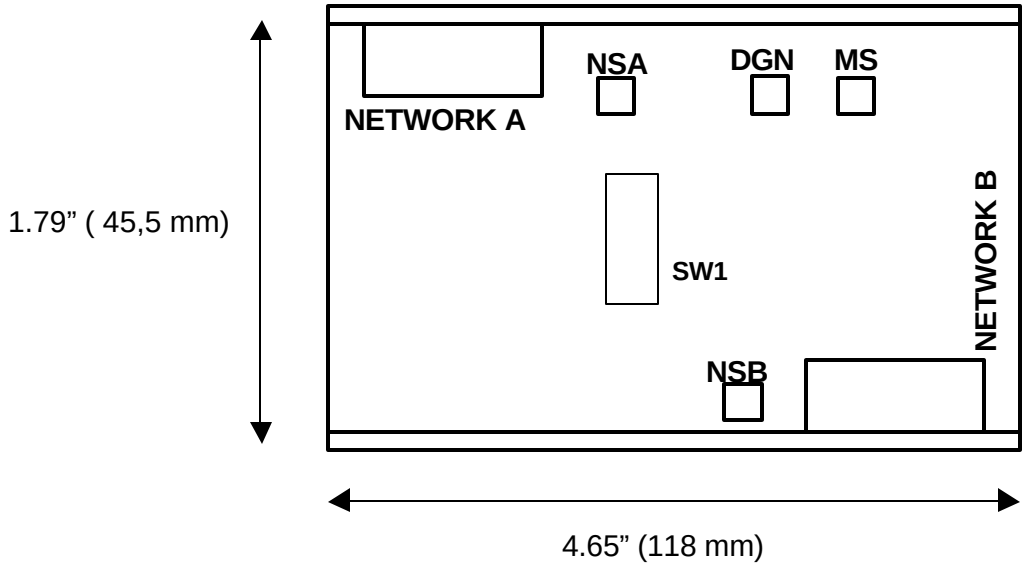


Figure 5-1 WRC-CANX-DIN CAN-Bus Extender

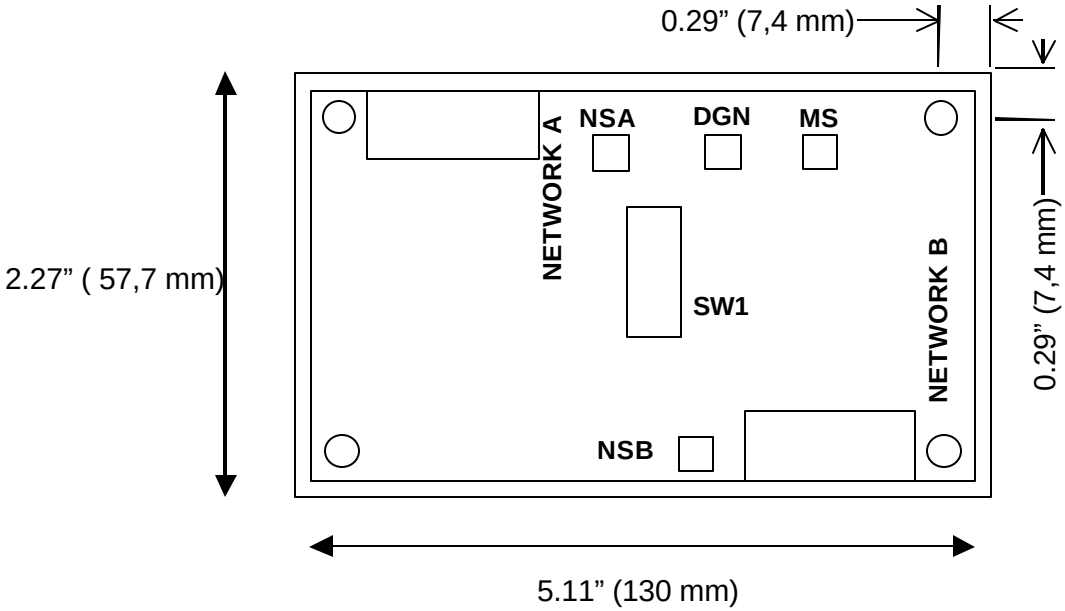


Figure 5-2 WRC-CANX-NEM CAN-Bus Extender

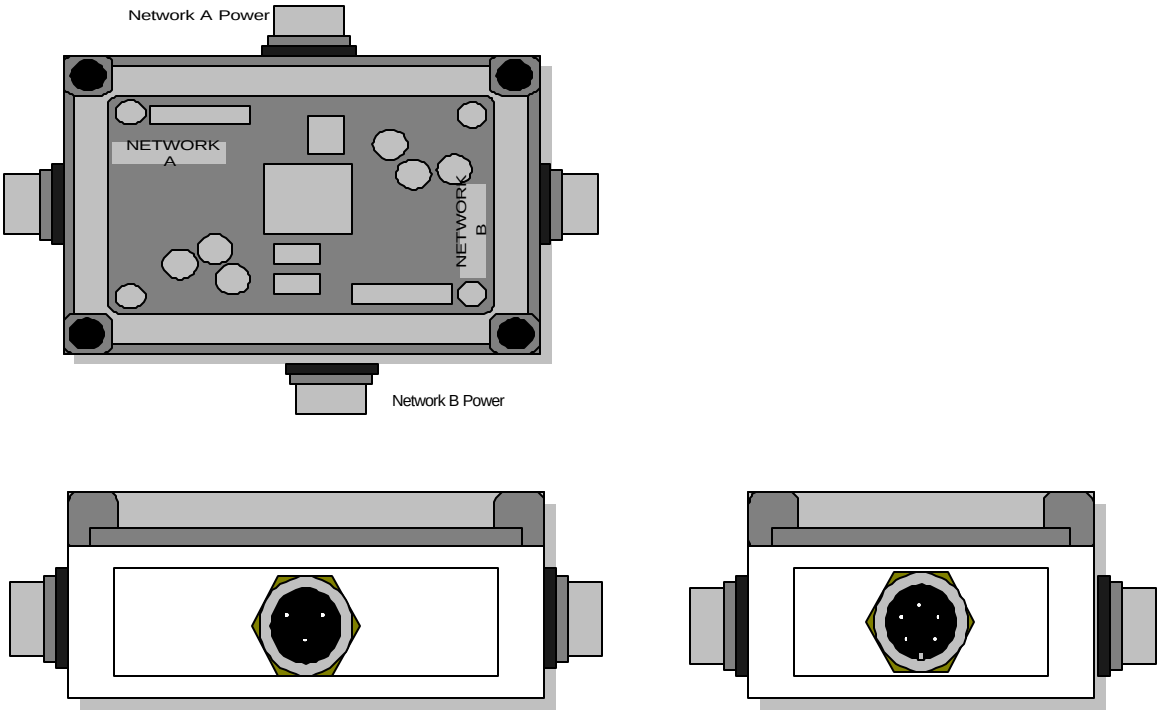


Figure 5-3 WRC-CANX-NEM-DN

5.2. DIP Switch Settings

The WRC-CANX-XX Multiplexer has a 6-pole DIP switch. Switch positions 5 and 6 are used to set the baud rate. (Switch positions 1-4 are reserved for future functions.) The CANX has shipped with 2 styles of DIP switches – slide and piano. The following sections describe the settings for each style.

5.2.1. Slide Switch Version

Table 5-1 Baud Rate Settings for Slide Switches

Baud rate	Position 1-4	Position 5	Position 6
125K	n/a	ON	ON
250K	n/a	ON	OFF
500K	n/a	OFF	ON
Autobaud	n/a	OFF	OFF

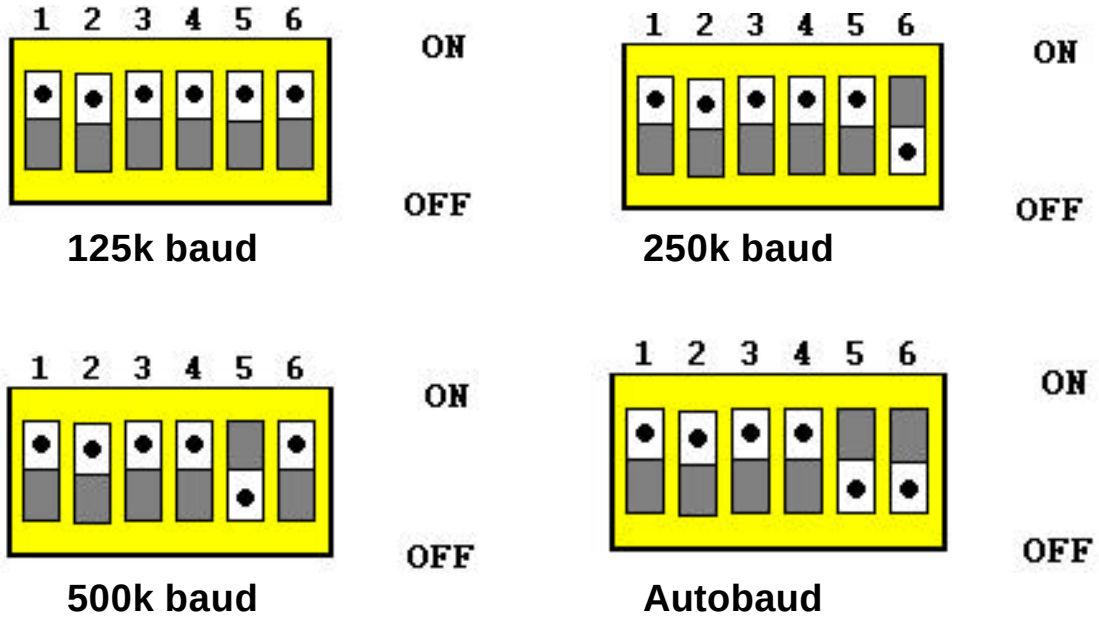


Figure 5-4 DIP Switch Setting for Baud Rate – Slide Switch

5.2.2. Piano Switch Version

Table 5-2 Baud Rate Settings – PIANO Switch Only

Baud rate	Position 1-4	Position 5	Position 6
125K	n/a	CLOSE	CLOSE
250K	n/a	CLOSE	OPEN
500K	n/a	OPEN	CLOSE
Autobaud	n/a	OPEN	OPEN

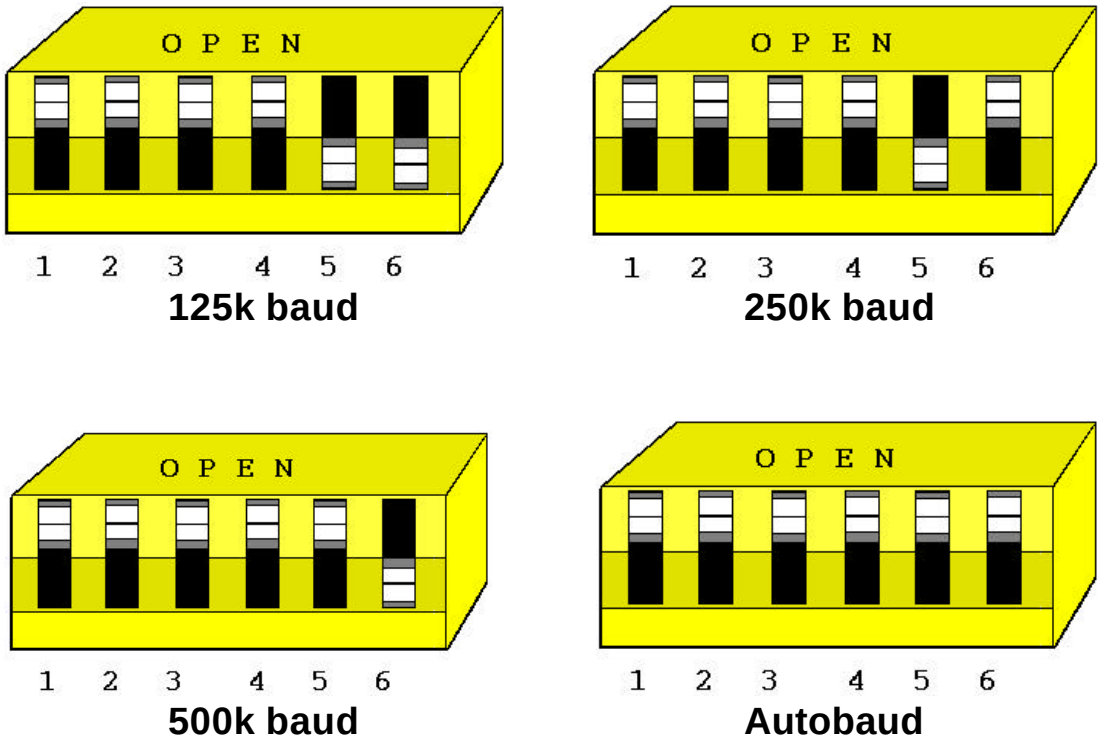


Figure 5-5 DIP Switch Settings – PIANO Switch Only

5.3. LED Operation

The WRC-CANX-XX Multiplexer has four (4) LED's that provide visual status information to the user about the product and the DeviceNet network. See Figure 5-1, Figure 5-2 Table 5-3 and Table 5-4.

Table 5-3 Module Status LED (labeled MS)

LED State	Module Status	Meaning
OFF	No Power	There is no power through DeviceNet.
Green	Device Operational	WRC-CANX is operating normally.
Flashing Green	Device in Standby	WRC-CANX is in initialization.
Flashing Red	Minor Fault	Recoverable fault.
Red	Unrecoverable Fault	WRC-CANX may be damaged.
Flashing Red/Green	Device Self-Testing	WRC-CANX is in self-test mode.

Table 5-4 Network Status LED's (labeled NSA and NSB)

LED State	Module Status	Meaning
OFF	No Power / Not on-line	WRC-CANX has no power or device is not operating.
Flashing Green	Autobaud selection	The WRC-CANX is waiting for a valid message to fix the baudrate.
Green	On-line	WRC-CANX is operating normally.
Flashing Red	Communications error	One of several communications errors (defined below) has occurred.
Red	Critical link failure	WRC-CANX has detected an error that makes it incapable of communicating on the link.

Communications errors include:

- Transmit Check
- Bus Off
- Error Passive
- Warning Level

Table 5-5 Diagnostic Status LED's (labeled DGN)

LED State	Module Status	Meaning
OFF	Normal operation	No Power, or Normal Operation with power applied.
Flashing Red	Communications error	The internal FIFO stack has overflowed on one of the network sides because the other network could not complete communications.

5.4. Power Requirements

The WRC-CANX-XX CAN-Bus Extender subsystem is powered from the 11-25 Vdc provided by the DeviceNet network. The WRC-CANX consumes 70 mA of current at 24 Vdc, or 1.8 Watts, typical. See Section 4.

Power is typically taken from the bus on each side and each side (A and B) requires power. Power applied to the A Side powers the entire unit except the B Side isolated transceiver. If isolation is not required for your application, then the power line may be jumpered from side A to side B. Care must be taken that the power supply is capable of handling the entire load on both sides of the CANX.

The NEMA version has an extra power connector on each network side. This can be used as a power tap to source power to another device, or it may be used as the power supply connection for the CANX and the network on each side.

5.5. Network Cabling and Configuration

This section provides general guidelines for connecting DeviceNet and SDS systems. You can find detailed specifications in the appropriate ODVA DeviceNet and Honeywell SDS specifications.

5.5.1. Cable Lengths

The following provide cable length limits for DeviceNet and SDS systems.

Table 5-6 Network Maximum Lengths - DeviceNet

Baud Rate	Trunk Line Length		Drop Length			
	Maximum Distance		Maximum		Cumulative	
	Meters	Feet	Meters	Feet	Meters	Feet
125 Kbits/s	500 m	1640 ft	6 m	20 ft	156 m	512 ft.
250 Kbits/s	250 m	820 ft	6 m	20 ft	78 m	256 ft.
500 Kbits/s	100 m	328 ft	6 m	20 ft	39 m	128 ft.

DeviceNet has a limit of 64 nodes per network for any baud rate. The CANX does not count as an addressed device.

Table 5-7 Network Maximum Lengths - SDS

Baud Rate	Trunk Line Length (maximum)		Drop Length (maximum)		No. Nodes
	Meters	Feet	Meters	Feet	
125 Kbits/s	457.2	1500	3.6	12	64
250 Kbits/s	182.8	600	1.8	6	64
500 Kbits/s	91.4	300	0.9	3	64
1 Mbits/s	22.8	75	0.3	1	32

SDS has a limit of 32 nodes per network for any baud rate. The CANX does not count as an addressed device.

5.5.2. Network Termination

A CAN-Bus system **must be terminated at each end of the trunk line**. The host controller and the **last** CAN-Bus Extender or other DeviceNet device on the network section must always be terminated to eliminate reflections, even if only two nodes are present. Follow the information below when using a CANX.

Trunk line use

For the purpose of network termination, the CANX is treated as the last node on the section of the trunk network to which it is connected. Therefore, when a CANX is used directly in a trunk line, it must be terminated on both the Network A and Network B sides. You must also place a terminating resistor on the other end device of Network A and on the last device on Network B side of the trunk line.

Drop line use

When CANX is used in a drop line (the Network A side is toward the main trunk), the Network A connection is **not** terminated. In this configuration the Network B section is considered as an independent bus line electrically. The CANX, as the first node in this new bus line and must be terminated, and the last device on the line must also be terminated.

Some specifications for the terminating resistor are:

Table 5-8 Terminating Resistors

DeviceNet	SDS
121 ohm 1% metal film 1/4 watt	120 ohm 2% 1/4 watt

Important: Per the DeviceNet and SDS specs -- do not terminate devices on drop lines.

An appropriate terminating resistor kit, WRC part number RM121DN, which satisfies both DeviceNet and SDS specs, is included with your Extender.

Note: The WRC-CANX-NEM family is configured at the factory with 2 **internal terminating resistors** on each network – one for Network A and one for Network B. If the CANX is used in a trunk line, no other terminators should be placed at the CANX end of either network.

Note: If the CANX is used on a **drop line**, the internal terminating resistor should be removed on Network A – the drop line directly from the trunk line. Please consult the factory.

5.5.3. DeviceNet Connection Wiring

The supplied 5-pin CAN-Bus connection plug accepts cable sizes from 12 AWG - 24 AWG. The maximum wire size (12 AWG) has an area of 6530 circular mils and the smallest (24 AWG) has an area of 3265 circular mils.

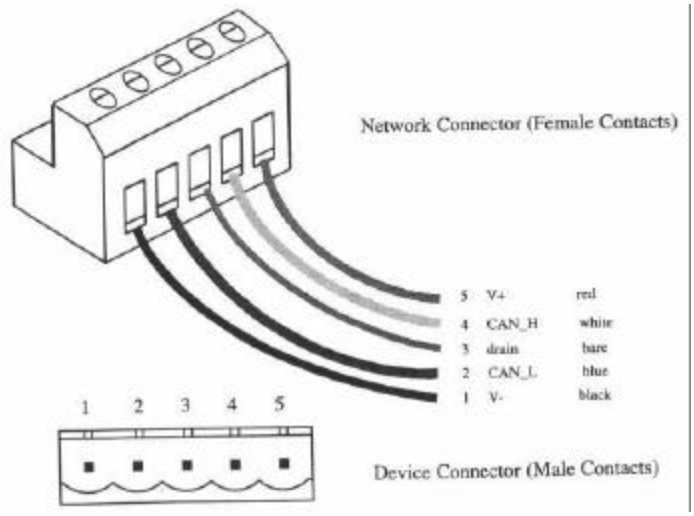


Figure 5-6 WRC-DANX-DIN-DN DeviceNet cable connector

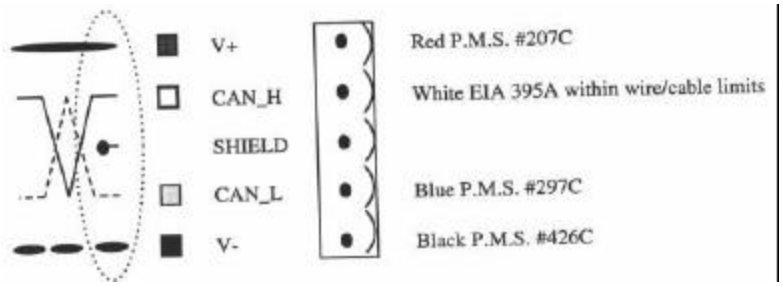
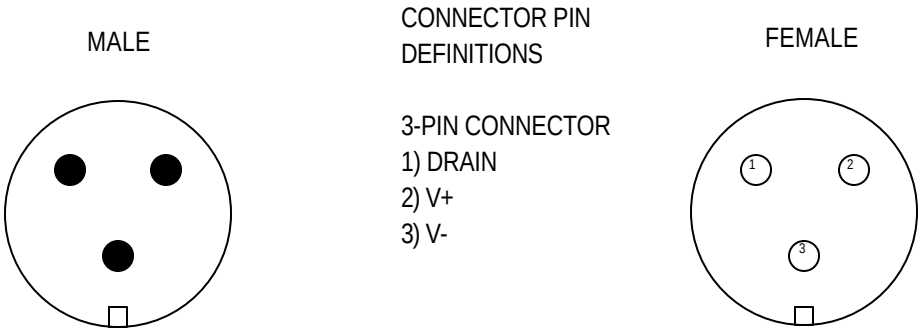
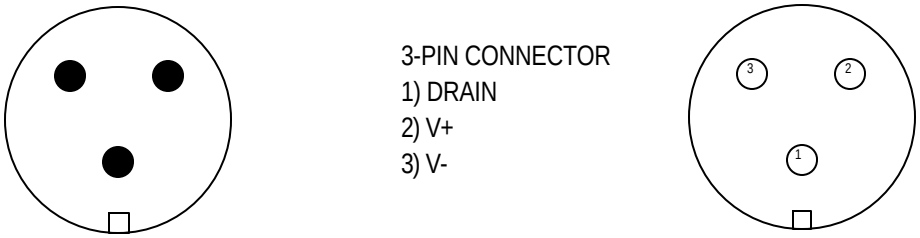


Figure 5-7 DeviceNet cable specifications

WRC-CANX-NEM-DN POWER CONECTOR PIN-OUT



WRC-CANX-NEM-AU POWER CONECTOR PIN-OUT



WRC-CANX-NEM-DN/AU DEVICENET CONECTOR PIN-OUT

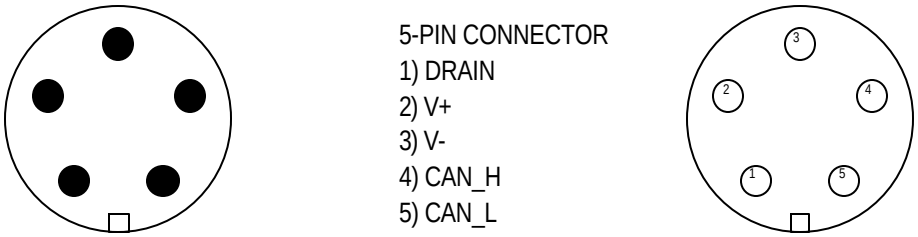


Figure 5-8 WRC-CANX-NEM Power and DeviceNet Connectors

5.5.4. SDS Bus Connection Wiring

The supplied 5-pin CAN-Bus connection plug accepts cable sizes from 12 AWG - 24 AWG. The maximum wire size (12 AWG) has an area of 6530 circular mils and the smallest (24 AWG) has an area of 3265 circular mils.

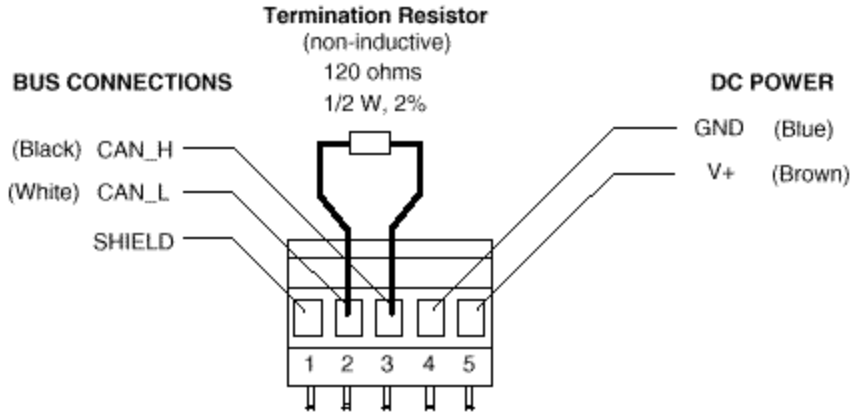


Figure 5-7 SDS Plug Connector

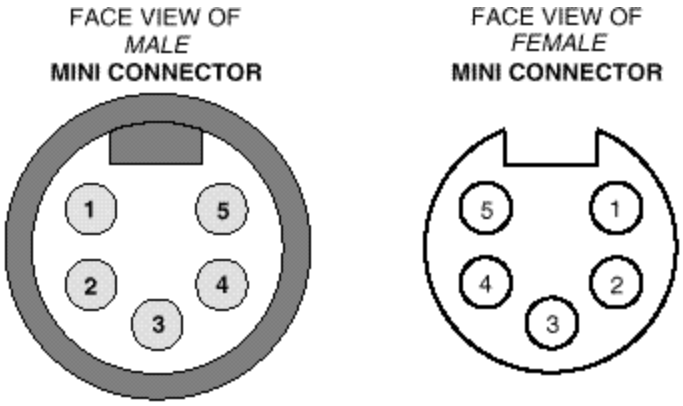


Figure 5-9 SDS Mini Connector

6. Operation

The CANX receives and stores messages received at either network connection and actively re-transmits the messages while providing 2500V isolation between the two sections of the network. The two bus connections for each CANX are referred to as Network A and Network B, and they are the same logical network with isolation between them. The CANX may be used to extend the maximum distance that a network can operate at any given speed. That is a CANX may be used

- to extend the network beyond its absolute maximum length (e.g., 500 meters for DeviceNet) at the slowest speed
- to use a longer network for higher speed baud rates (e.g., pushing a 500K baud network beyond 100 m for DeviceNet)
- to extend the length of the drop cable (e.g., longer drops than 6 m for DeviceNet)

The CAN Bus is connected to each side of the CANX and each side receives its power and signals from the Bus on its respective side.

Whenever a message is transmitted on the Bus to which CANX is connected, CANX receives the message on the side where it was initiated and performs a store-and-forward of the message to the other side. This action is performed for any valid CAN message independent of who generated it or to whom it is addressed.

The CANX is not addressed as a specific device on the Bus and cannot be interrogated by other nodes. It is transparent to all other nodes on the bus.

6.1. Application Notes

To help insure ease of installation and reliable operation of your system, the following guidelines should be followed CANX installation in your CAN network.

1. Install the Network A side of CANX toward the Bus Master.
2. Power up the Network A side before the Network B side of CANX. This will fix the baud rate on the CANX to that of the Master, assuming that the Master is sending messages.
3. There is approximately a 75 µsec propagation delay of the message through the CANX.
4. **In autobaud mode**, use only one CANX in any network section. That is, only use one CANX per trunk line and a maximum of one each per drop line.
5. **In fixed baud rate** configurations, multiple CANX units may be used to extend the Bus multiple times over the defined distance limits.
6. CANX is not a grounded device and the Bus shield is not connected electrically to the device. Therefore, follow appropriate wiring practices to eliminate noise and other problems.

6.1.1. General Installation

Examples of valid configurations are shown in the following figures.

6.1.2. CANX Theory of Operation

As described the CANX performs a store-and-forward operation on each message received. The operation is described in this section.

The CANX will verify and accept (consume) on either network side any and all valid messages. The message will be momentarily stored internally and the CANX will immediately attempt to re-send (produce) the message on the other side bus. Because the other side of the CANX is a different bus electrically and from a data link perspective, it will perform a negotiation session on that bus section to retransmit (produce) the message onto that section. This action has the effect of doubling the overall number of total attempts to get onto the bus. This is the case because every message is reproduced independent of where the target node exists; that is, the CANX does not interrogate the message to determine the target node and does not know physically where the target node is connected.

As the bus negotiation is performed on the second side, the retransmitted message may or may not get on the next bus section immediately. That will depend solely upon the priority of the message the CANX is sending with respect to the messages being generated by nodes on that side of the bus and on the amount of overall bus traffic on that side. In the case where the CANX does not immediately win the negotiation it stores the messages and attempts to resend it in the same fashion as any other device on the network. To the extent that it cannot produce immediately the message will be stored in an internal buffer until it can be sent.

As other messages arrive at the CANX they also are put into an internal buffer and retransmitted as quickly as possible. The internal buffers (one for each side) are FIFO buffers so that the messages for each side will be retransmitted in the order that they are received with respect to the other messages received on the same side. Up to 15 messages can be held in the internal FIFO buffer for each side.

6.1.3. Network Throughput Design Considerations

The effect of the operations described above and the internal propagation delay inside the CANX (approximately 75us) as it performs the store-and-forward is that it may be possible to design a network with more traffic that the CANX can reasonably be expected to handle. Care should be taken to design the network so that the amount of total traffic does not exceed the capabilities of the total system. Each application and installation has its own requirements and configurations so a definitive formula would be very difficult to define. However, a good rule of thumb would be to set up the scan time for a network that includes a CANX that is no faster that twice the fastest scan time possible to achieve the desired communications that may be obtained without the CANX.

In the event that the network operation prevents all messages on one side from getting out before the buffer on that side fills, subsequent messages will be lost. The CANX will continue to process transmitting all stored messages and will accept new messages if once room clears in the buffer. The red LED labeled DGN will illuminate and will remain illuminated for 10 seconds after the "buffer full" condition clears.

6.1.4. Fixed Operation

Fixed baud rate operation has two specific advantages. One is that it can be used in networks where all devices on one are autobaud only. The second is that multiple CANXes can be used in series to extend the total length of the trunk or drop line further that with just one CANX device.

The baud rate is set by setting SW1 switch positions 5 and 6 before powering up the A side of the CANX. See Table 5-1.

6.1.5. Autobaud Operation

Autobaud operation has the advantage of allowing a system implementer or designer to ignore the operating baud rate when installing the CANX. The primary disadvantage is that it cannot be used in applications where all devices the A side are also autobaud. The general product design practice is that when an I/O device is autobaud, it does not transmit a DupMacID request message immediately upon power up. It waits for another (fixed baud rate) device to send its DupMacID message in order use that message to determine to which baud rate the network has been set. In that case there is no device that initiates this DupMacID sequence, so all the autobaud devices will just wait for some valid message to be generated.

In addition to this consideration, although multiple CANXes may be used in an installation, only one CANX may be used in any one trunk or drop line.

The baud rate is set by setting SW1 switch positions 5 and 6 before powering up the A side of the CANX. See Table 5-1.

6.1.6. Example Configurations

Examples of valid configurations are shown in the following figures.

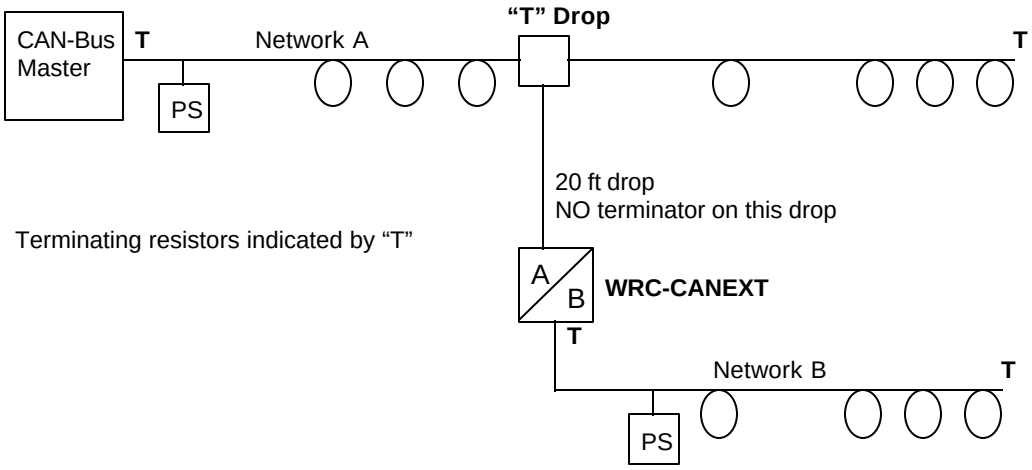


Figure 6-1 CANX on a drop line

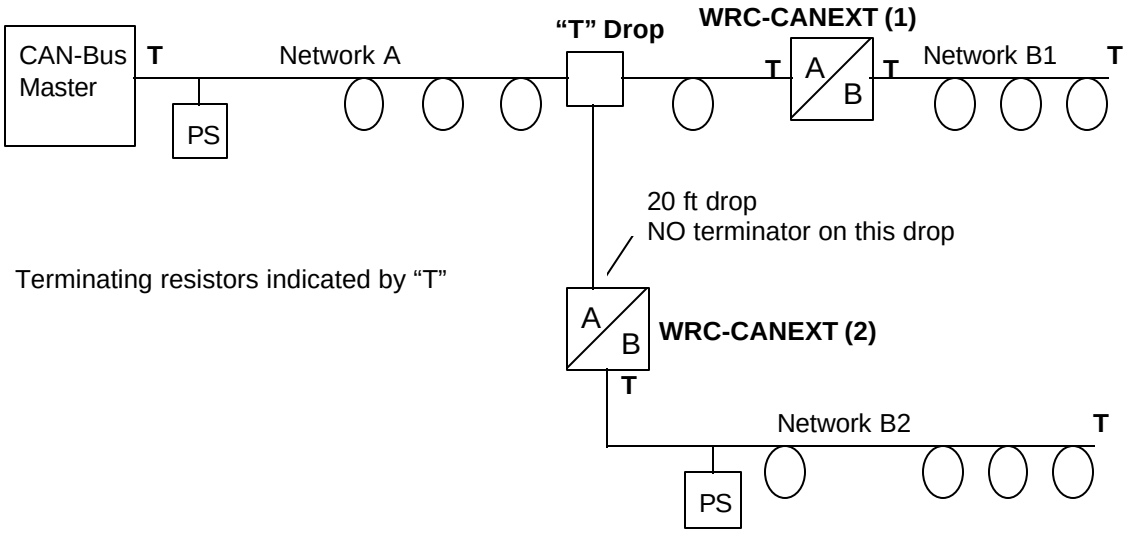


Figure 6-2 CANX on Trunk Line and Drop

7. Accessories and Other CAN Products

The following components can be used with a WRC-CANX CAN-Bus Extender for replacements or spare parts.

Part	WRC P/N	Equivalent Mfr. Part Number
• CANX-DIN Link Connector and Terminator Resistor	CANX-DN-CK	Phoenix Contact MSTB2.5/5-ST-5.08/AU
• CANX-NEM Cable	n/a	Various manufacturers' Mini-Style Connector Examples: Cable assy. w/ female threads, fem. sockets: Turck RKM 570-*M/630 ("trunk line") Turck RKM 571-*M/630 ("drop line") Cable assy. w/ male threads, male pins: Turck RSM 570-*M/630 ("trunk line") Turck RSM 571-*M/630 ("drop line")
• DIN rail (1 meter)	WRC 50022	Phoenix Contact NS 35/7,5 0801733 (2 m) Allen-Bradley 199-DR1 (1 m)
• Terminating resistor	RM121DN	121Ω,1%, metal film, axial lead resistor

WRC also provides discrete and analog I/O signal conditioning and multiplexing on DeviceNet.

Table 7-1 Additional WRC DeviceNet Products

Part	WRC Part Number
DIN rail	WRC 50022
Terminating resistor, axial lead	RM121DN
Connector, 5-pin mini-round for CANX, CANR	B 4151-0/16 (Turck)
Discrete I/O block – 4 channels	1782-JDB4
Discrete I/O block – 8 channels	1781-JDB8
Analog Input block – 4 channels, 10-bit	1782-JDA4
Analog I/O block – 8 channels, 12-bit	1782-JDA8
DeviceNet to Serial I/O Gateway	1782-JDC
DeviceNet to Modbus Gateway	1782-JDM
Discrete I/O block – 24 channels	WRC1-JDB24
Discrete I/O block – 48 channels	WRC1-JDB48
Discrete I/O, Analog Input block – 24 DIO, 32 AI	WRC1-JDA/24
Discrete I/O, Analog Input block – 48 DIO, 32 AI	WRC1-JDA/48
Analog I/O block - 32 channels	WRC1-JDAIO
Discrete and Analog I/O block – 24 DIO, 32 AIO	WRC1-JDAIO/24
Discrete and Analog I/O block – 48IO, 32 AIO	WRC1-JDAIO/48
Discrete I/O block – 8 DIs, 8 DOs, 4 AIs	W5-JDB16x
DeviceNet, CANopen Extender, DIN mount	WRC-CANX-DIN-DN
SDS Extender, DIN mount	WRC-CANX-DIN-SD
DeviceNet, CANopen Extender, DIN mount	WRC-CANX-DIN-C7
DeviceNet, CANopen Extender, NEMA box	WRC-CANX-NEM-AU
DeviceNet, CANopen Extender, NEMA box	WRC-CANX-NEM-DN
SDS Extender, NEMA box	WRC-CANX-NEM-SD
DeviceNet, CANopen Extender, Fiber Optic, NEMA box	WRC-CANR-DF-DN

8. Troubleshooting

This section identifies some of the common problem observed when commissioning or operating a CANX Extender.

Problem:

Module Status LED is solid Green
Network Status LED is flashing Green
Device will not communicate on the network

Possible Solutions:

1. In autobaud mode, a valid message has not been received from which to fix a baud rate. No transmissions have been initiated.
2. Network does not have a terminating resistor. Add a 121-ohm resistor across the CAN_H and CAN_L signals at the first and last nodes.
3. Network cable in broken or disconnected.

Problem:

DGN LED is solid Red
Internal FIFO message is full
New messages are ignored

Possible Solutions:

1. Too much traffic on the network – reconfigure the network communications